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EXAMINER	
TURK, NEIL N	

ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,991	UNLU ET AL.	
	Examiner	Art Unit	
	NEIL TURK	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-45* is/are rejected.

7)☒ Claim(s) *4,5,18,22,26,27,32,39 and 42* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *9/19/05* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/19/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the plurality of regions in a pattern of an array between the first and second reflective surfaces, each defining a resonant cavity (as in claims 1, 23, and 44) (or cavity, i.e. as recited in claims 2, 24, and 45) must be shown or the feature(s) canceled from the claim(s). Further, the beam expander (claim 10) and beam condenser (claim 11) must be shown. Additonally, the photodetector array integral with a support for one of said reflective surfaces which is not supporting a capturing material, as defined in claim 20, must be shown. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "16" has been used to designate all of a channel, a cavity, and a space. Reference character "10" has been used to designate both a lens and a channel. Reference character "80" has been used to designate both a cell and a cavity. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 4, 5, 26, 27, and 42 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims

4, 5, 26, and 27 do not further limit the subject matter of their respective, previous claim(s) as claims 4, 5, 26, and 27 are draw to further limitations of the capture material. Independent claims 1, 23, and 24 do not establish the capturing material as a positively claimed element of the device, nor do they establish the application of such a capturing material as a step in the process. Independent claims 1, 23, and 24 merely establish that either one of the first and second reflective surfaces have a capability of receiving a capturing material. As independent claims 1, 23, 24 do not establish the capturing material as a positive element of the device/method, the dependent limitations which point to the positive establishment of a capturing material in claims 4, 5, 26, and 27, do not further limit the subject matter of the respective previous claim(s).

Claims 18 and 39 are objected to because of the following informalities: The wording of claims 18 and 39 are objected to as being improper. Appropriate correction is required.

Claim 22 is objected to under 37 CFR 1.75 as being a substantial duplicate of **claim 19**. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). As both the "means for dynamically varying spacing of the first and second surfaces" and "means for varying the spacing of said reflective surfaces" are both drawn to the same structural elements of the micrometers coupled to the piezo-control elements, claim 22 is seen to be a duplicate of claim 19.

Further there is no additional structure provided for the function in claim 22 of varying the cavity resonance, and as such, this is seen as an inherent function in the varying of the spacing.

Claim 32 is objected to because of the following informalities: Examiner asserts the word "expand" should be changed to "expanding". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9, 17-19, and 22 recite "means for sweeping the wavelength", "means for causing said radiation to emit at discrete different wavelengths", "means for controlling a temperature", "means for dynamically varying spacing", "means for varying the spacing", respectively. The Examiner has interpreted this limitation as a means-plus-function limitation covered by 35 USC 112, sixth paragraph. This interpretation is proper since the claim limitation recites "means for" language, and the "means for" is not modified by sufficient structure for achieving the specified function. A means-plus-function limitation recites a function to be performed rather than definite structure or materials for performing that function. For claims falling under 35 USC 112, sixth paragraph, Examiners are required to construe claims as covering the corresponding structure, material, or acts described in the specification and equivalents thereof, see *In re Donaldson Co.*, 29 USPQ2d 1845 (Fed. Cir. 1994). However, the specification does not

set forth the corresponding structure. Thus, it is unclear and indefinite what structure Applicant is intending to encompass with the "means for sweeping the wavelength", "means for causing said radiation to emit at discrete different wavelengths", "means for dynamically varying spacing", and "means for varying the spacing" limitations.

For purposes of examination, the Examiner has strictly construed the "means for sweeping" and "means for causing said radiation to emit at discrete different wavelengths" limitation as capabilities of the operation of a light source since the specification does support tuning of the source and a controller applied to the source, see paragraph [0025-0029, 0062] of the pre-grant publication US 2006/0182659. However, clarification is required, as it is unclear if such "means for" recitations are merely drawn to capabilities of an element, or are directly associated with a structural element.

Further, the Examiner has strictly construed the "means for controlling a temperature" as the heating element 42 since the specification does support use of such as disclosed in paragraph [0031].

Further, the Examiner has strictly construed the "means for dynamically varying spacing" and "means for varying spacing" as piezoelectric drives in association with the computer 34 and micrometers (actuators) 23, 24, that are applied to the stages 19 and 21,as well as to the reflective surfaces, as the specification does support such in paragraph [0030]. However, clarification is required.

Claims 9 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is meant by the recitation, "…sweeping the wavelength of said tunable laser (radiation; cl. 31) over a range...". As the recitation of "the wavelength" points to a single wavelength, it is unclear how a single wavelength may allow for sweeping over a range. As such, a tunable laser or tuning radiation will be taken to read on such sweeping as recited in the claims.

Claims 23-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With regards to independent claims 23 and 24, the detecting step is unclearly recited in the claims. **Claim 23** recites, in relevant part, "…detecting the radiation in each said cavity and operative to indicate a change in the standing wave pattern reflective of binding of capturing material with material in a fluid within each said cavity". First, the recitation is not clearly understood as the recitation does not read properly, and appears to be missing a few articles of speech. Further, what is meant by "…and operative to indicate a change"? Does Applicant intend to recite that the detected radiation is operative to indicate a change...? Further, the detecting step is unclear in how it is operative to indicate a change in the standing wave pattern reflective of binding of the capturing material with material in a fluid within each cavity, as neither the capturing material nor the material in a fluid have been positively recited as steps in the method. Applicant does not recite steps, such as providing a

fluid with material and a capturing material to the resonant cavities. As such, it is unclear how any such detection or indication can be made if the capturing material and material are not positively provided as part of the method.

Likewise, **claim 24** contains the same issues that pertain to claim 23. Herein however, the detected radiation is operative to indicate the level of binding by the capturing material of material in said fluid within each cavity. As discussed above, this detection is unclear as the capturing material and material have not been positively established in the method. Further, it is unclear what is meant by, "...detecting the radiation of binding by said capturing material of material in said fluid within each said cavity". What level of binding is being detected? Does Applicant intend to detect the level of binding of the capturing material to the material? Is the binding between the capturing material and something else? Clarification is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-7, 10-16, 21, 23-29, 32-37, 42, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel et al. (5,982,534) in view of Pepper et al. (2002/0068018), hereafter Pepper.

Pinkel discloses a specimen illumination apparatus (abstract; lines 28-37, col. 4; col. 7&8, fig. 1). Pinkel discloses with a first reflective surface slide 303 and a second reflective coverslip 305 formed on top, thereby forming a channel to accommodate specimen 317 therebetween. Examiner asserts there exists a plurality of regions in a pattern of an array between the reflective surfaces 303 and 305, as such claimed regions are not bound/defined by any specific structural elements/limitations and thereby such regions can be said to exist in the space between the first and second surfaces 303, 305. Pinkel further discloses an excitation source 311 (such as any known excitation source, e.g. a laser; lines 54-65, col. 7) to provide excitation light through optical cavity 301, and it thereby enters slide 303 by prism 313 (beam expander) where it is reflected by total internal reflection from the lower surface of slide 303. The light can then undergo total internal reflection from the coverslip 305, and after multiple reflections between slide 303 and coverslip 305, light may then make multiple passes back and forth between the two prisms 313 and 315. Pinkel further discloses that lens 319 detect light emitted or scattered by the specimen, and lens 319 (beam condenser) collects scattered and/or fluorescent light, and the lens can be a component of any known device for detecting an optical signal, such as photodiodes, CCD cameras, etc. (lines 1-34, col. 5; lines 35-50,col. 8; column 11, figs. 1-3).

Pinkel does not specifically disclose the use of an IR radiation source, or applying IR radiation.

Pinkel does not disclose an array of regions, in which each region defines a resonant cavity or cavity.

Pepper discloses a compact sensor for biological or chemical species using microcavity structures (abstract). Pepper discloses a metal or dielectric surface 1textured with a lattice to form microcavities 2 in an array pattern, into which particles of material to be detected can fall. Pepper discloses that due to the field enhancement inside the cavities 2, the adsorption of the probe beam 4 (such as an infra-red probe beam) is much greater than it would be if the particle were simple in a free space or on a smooth surface (paragraphs [0004, 0033, 0037, 0044, 0051, 0052, 0056, 0076, 0084]+, fig. 1+). Pepper further discloses a scanning detector 11 so as to detect the signal from each section of the surface 1 (paragraph 0127).

It would have been obvious to modify Pinkel to include the use of an IR radiation source and applying IR radiation such as taught by Pepper in order to provide a known alternative source of radiation for use in an optical interrogation sensing system.

It would have been obvious to modify Pinkel to include one of the layers with a textured latticed defining an array of resonant cavities such as taught by Pepper in order to provide field enhancement of the species being analyzed so as to allow for greater sensitivity in detection.

Claims 8, 9, 17, 30, 31, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel in view of Pepper as applied to claims 1-5, 7, 10-16, 21, 23-27, 29, 32, 33-37, 42, 44, and 45 above and in view of Lewis et al. (4,917,462), hereafter Lewis.

Pinkel/Pepper has been discussed above.

Pinkel/Pepper does not specifically disclose a tunable laser, means for causing the radiation source to emit at discrete wavelength, tuning the applied radiation, or sweeping the wavelength over a range.

Lewis discloses an optical microscopy device and technique for use in the microanalysis of materials (abstract). Lewis discloses that light, from an intense, tunable light source 60, such as a laser, is directed in a transmission mode of operation through the transparent stage 58 and into the sample 56 to be imaged. Lewis discloses that the light excites spectral phenomena in the sample, such as through fluorescence (lines 15-35, col. 10).

It would have been obvious to modify Pinkel/Pepper to include tuning of the applied radiation and sweeping over a wavelength range by way of a tunable laser source that may emit at discrete different wavelengths such as taught by Lewis in order to provide a known alternative light source for optical scanning to produce fluorescence emissions of target samples, and further to have a tunable source so as to provide the specified wavelength(s) of excitation light depending on the target sample at-hand.

Claims 18 and 39 rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel in view of Pepper as applied to claims 1-5, 7, 10-16, 21, 23-27, 29, 32, 33-37, 42, 44, and 45 above and in further Saul et al. (5,851,488), hereafter Saul.

Pinkel/Pepper has been discussed above.

Pinkel/Pepper does not disclose means for controlling a temperature of fluid in the channel, or controlling a temperature of fluid within the channel.

Saul discloses an electro-optical instrument for measuring a quantitative parameter of a sample by measuring fluorescence emitted. Saul discloses heating the sample to a proper temperature for the particular assay by way of a heater plate 54 about the cartridge 24 where sample is held (lines 30-41, col. 9, fig. 4A).

It would have been obvious to modify Pinkel/Pepper to include a heater plate for controlling a temperature of the fluid within the channel and to control the temperature of the fluid within the channel such as taught by Saul in order to provide for maintaining the sample at the proper temperature necessary for the most accurate assay.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NEIL TURK whose telephone number is (571)272-8914. The examiner can normally be reached on M-F, 9-630.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NT

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1797